Management of chilli thrips (*Scirtothrips dorsalis*) through application of calcium phosphate solution

S. Rajeshkanna, S. Mugunthini and R. Jathukula

Regional Agricultural Research and Development Centre, Kilinochchi, Sri Lanka

Introduction

Chilli is a major cash crop grown in Sri Lanka for both green and dry chilli production. The per capita dry chilli consumption of Sri Lanka is about 2.84 kg with the total national requirement per year is around 57,400 mt (DOA Sri Lanka, 2018).

Occurence of pests and diseases are the major constrains in chilli production in Sri Lanka. The chilli thrips, mites, whiteflies and aphids are the major causal agents to chilli leaf curl complex (Senanayake *et al*., 2013). Some viruses transmitted by whitefly and aphids to the chilli plant result severe Chilli Leaf Curl Complex (CLCC) (Weeraratna and Yapa, 2002). Bacterial wilt and fungal diseases such as Anthracnose and *Cercospora* leaf spot also cause a significant yield loss (Galanihe *et al*., 2004). Chilli crop has also affected by *Meloidogyne incognita* and *Meladogyne javanica* formed knots in roots and reduced the plant growth and damaged the yield in Matara district (Premachchandra *et al*., 2007).

Chilli growers in Sri Lanka mainly depend on pesticides to control insect pests and fungus diseases of chilli cultivation. Use of agro chemicals above recommended rates destroy the beneficial organisms which in turn increases pests infestation (Atakan, 2006). Therefore, farmers need alternative ways to manage pest and diseases instead of chemical control where bio-fertilizers can play a major role.

Green chilli, Garlic and Ginger (3G) solution is one of the bio pesticide which can help to reduce most of the foliage pests on various crops. However this product is not readily available for farmers' use.

It has also been found that, the hatch rate, feeding and oviposition of onion thrips were reduced on onion leaves treated with a kaolin based particle film (Larentzaki *et al*., 2008). Therefore, this study was conducted with same concept to manage the chilli thrips by using locally available material (Calcium phosphate) to form particle film on the leaf surface.

***** Short Communication***

Materials and methodology

This experiment was conducted in *Yala* 2018 at RARDC, Kilinochchi. The experiment field was prepared by ploughing twice with a disc and followed by planking to ensure a good soil tilth. Five treatments (Table 1) were laid in a Randomized Complete Block Design (RCBD) with three replicates. Chilli seedlings were planted at 60 cm x 60 cm spacing in plots having 4 m x 3 m dimension. Two seedlings were planted in each hill. Fertilizer was applied at recommended levels. Calcium phosphate surfactant were used as materials to prepare the solution. Calcium phosphate solution was sprayed once a fortnight since seedlings to harvesting stage. The knapsack sprayer was used to apply the solution on plants canopy. The initial application was done at two weeks after planting. The solution was sprayed immediately after preparation. Three plants per plot were selected randomly to count the population of thrips. Three leaves were selected as one from each top, middle and bottom part of the selected plants. The population count of the thrips was recorded on the following day after each application of calcium phosphate solution. The data obtained from the study were analyzed using SAS 9.1 statistical software. The least significant different was calculated following a Duncan's Multiple Range Test (at $p<0.05$).

Table 1. The treatments of the experiments

Treatment number	Dilution dosage
1	1 g Calcium phosphate/1*l* of water
2	2 gCalcium phosphate /1*l* of water
3	5 g Calcium phosphate /1*l* of water
4	10 g Calcium phosphate/1*l* of water
5	Untreated control

Results and discussion

Table 2 shows the effectiveness of various treatments on the thrips population on chilli plants after 24 hours of treatments and final yield of green chilli. The different dilution of calcium phosphate solutions caused reduction of population of chilli thrips after each treatment. The treatment with 10 g of calcium phosphate solution significantly controlled thrips compared to other four treatments. While there was an apparent reduction of pest population in T3, T2 and T1 also.

Table 2. Means population of thrips and average yield of green chilli.

Treatment	Thrips number/leaf	Yield (t/ha)
1 g Calcium phosphate /1*l* of water	13[b]	25.6[d]
2 gCalcium phosphate /1*l* of water	13[b]	29.3[c]
5 g Calcium phosphate /1*l* of water	10[b]	38.9[b]
10 g Calcium phosphate /1*l* of water	5[c]	60.9[a]
Untreated control	20 [a]	18.5[e]
CV	18.9	5.3
LSD	4.3	3.4

An increase in concentration of Calcium phosphate solution reduced the number of thrips on chilli leaf (Table 1) and increased the yield of green chilli. This may be because the foliar applications of calcium phosphate on chilli plants may have caused the accumulation of calcium phosphate particle on the leaf surface and thereby forming a mechanical barrier on the plant leaf surface.

Conclusion

The results of the study show that the application of Calcium phosphate solution significantly reduces the thrips population in chilli resulting higher yield compared to control. Calcium phosphate solution with 10 g/*l* of water is the most effective mixture ration among with the treatments tested.

References

Atakan, E., 2006, Associations between Frankliniella spp. and *Orius niger* populations in cotton, Phytoparasitica. 34. 221–234.

DOA. 2018. chilli, https://www.doa.gov.lk/fcrdi/index.php/en/crop/34-chilli, (Accessed on 12.05.2019).

Galanihe, L.D., M.G. Priyantha, D.R. Yapa, H.M.S. Bandara and J.A.D. Ranasinghe. 2004. Insect pest and disease incidences of exotic hybrid varieties grown in the low country dry zone of Sri lanka, Annals of the Sri Lanka Department of Agriculture. 6: 275-280.

Larentzaki E., A.M. Shelton and J. Plate. 2008. Effect of kaolin particle film on *Thrips tabaci* (Thysanoptera: Thripidae), oviposition, feeding and development on onions: a lab and field case study. Crop Protection 27: 727–734.

Premachandra, W.T.S.D., A.H.P. Lasanthi, K.H.M.A. Deepananda and R.C. Jayasinghe. 2007. Infestations of root-knot nematodes, Meloidogyne species, associated with selected vegetables crop in Matara district in Sri Lanka, Proceeding of the fourth academic sessions. 159-163.

Senanayake, D.M.J.B., J.E.A.R.M. Jayasinghe, S. Shilpi, S.K. Wasala and B. Mandal. 2013. A new bigamo virus – betasatellite complex is associated with chilli leaf curl disease in Sri Lanka, Journal of Virus Genes, 46. 128 – 139.

Weerarathne, W.A.P.G. and D.R. Yapa. 2002. Reaction of chilli accessions to local isolates of cucumber mosaic and chilli mottle viruses. Annals of the Sri Lanka Department of Agriculture. 4: 345-352.